REMARKS

Reconsideration and allowance of this application are respectfully requested.

I. Summary of Office Action

Claims 1, 2 and 4-7 are all the claims pending in the application.

Subsequent to filing a Notice of Appeal and an Appeal Brief on April 2, 2007, this office action issued based on a new ground(s) of rejection: Ribas-Corbera (USP 6,535,251) and Lin et al. (USP 6,748,019: hereinafter referred to as "Lin").

Claims 1-2, 4-5 are rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Ribas-Corbera.

Claim 3 was allowed before filing the Notice of Appeal.

Claim 6 is rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Lin.

Claim 7 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Lin in view of Ribas-Corbera.

II. Analysis of Claim Rejection

[Claim 1]

In rejecting claim 1 under § 102(e), the Examiner alleges that Ribas-Corbera discloses all operations (a)-(d) of the claimed method for encoding a video signal with a variable bit rate. Applicant respectfully disagrees.

As known in the art, there are defined two bit rate control methods in encoding a video signal: Constant Bit Rate (CBR) method and Variable Bit Rate (VBR) method. The VBR method is generally classified into a one-pass VBR method and a two-pass VBR method. In the CBR method, each group of pictures (GOP) has an almost uniform bit rate and a different quantization parameter (QP), while in the VBR method, each GOP has an almost uniform QP and a different bit rate.

The present application addresses problems of one-pass Variable Bit Rate (VBR) method in which a target bit rate is not obtained well. To address this problem, the present application provides a video encoding method characterized by obtaining a quantization parameter (QP) of a frame based on the complexity of each picture and the remaining bit amount for each picture, by which it is possible to more closely approach a target bit amount.

On the contrary, Ribas-Corbera is directed to the CBR method for video encoding. Therefore, the basic approach to obtain QPs is different to each other.

That being said, the claimed method discloses, as noted above, an operation of calculating a QP of a current frame on the basis of, *inter alia*, the remaining bit amount for each picture as well as the complexity for each picture. Note, here, that a "remaining bit amount" for each picture is used for calculating a QP of a current frame. As known in the art, each picture (I, P and B pictures) included in a video sequence has a target bit amount for encoding (refer to paragraph [40] of the specification of the present application). Thus, the language "remaining bit amount" should be interpreted as the total bit amount assigned to each picture less the bit amount

used for encoding upto the current frame. This "remaining bit amount" is used for calculating the QP of the current frame.

With respect to the above aspect of the claimed method, the Examiner simply alleges that col. 8, lines 5-35 of Ribas-Corbera discloses an operation of calculating a remaining bit amount for each picture. Applicant respectfully disagrees with the Examiner's position.

Ribas-Corbera appears to also disclose a method for obtaining a QP (also called as quantization step) for encoding. However, the reference does not teach the concept of using a "remaining bit amount" for each picture to calculate a QP. In the above-cited part, the reference discloses only the use of the "number of error bits" which deviates from the average bits used for encoding. This number of error bits is used for calculating Q_{MAX} and Q_{MIN} which is subsequently used to determine a QP for a GOP. Remember that each GOP has a different QP in the CBR method to which the reference is directed to. There is no concern about the remaining bit amount for each picture in this reference.

Moreover, throughout the entire disclosure of Ribas-Corbera, the bit amount considered to calculate a QP for each GOP is only the total number of bits (B_{GOP}) assigned to the GOP to maintain an almost uniform bit rate for each GOP, and the average number of bits for each GOP (B_{AVG}). Neither of these B_{GOP} and B_{AVG} corresponds to the "remaining bit amount for each picture". In addition, note that these bit amounts of the reference are calculated or set by GOP not by each picture. Also, it should be noted that the reference is directed to a CBR method.

Therefore, the reference fails to teach at least two operations of the claimed method which uses the remaining bit amount for each picture to calculate a QP of a current frame.

Applicant respectfully submits that the claimed method would not have been anticipated by Ribas-Corbera.

[Claim 2]

The Examiner cites col. 6, lines 50-60 to reject the claim.

However, the cited part only discloses calculating a QP of a GOP which differs by GOP in a video sequence. The reference does not teach how to obtain the remaining bit amount for each picture. More specifically, there is no disclosure of using a total bit amount of "remaining frames for each picture".

Thus, claim 2 should be patentable without regard to its dependency.

[Claim 4]

In rejecting this claim, the Examiner cites col. 6, lines 20-30. The cited part discloses an equation for calculating a QP of a GOP. Here, however, the denominator used to calculate a QP is the total number of bits of a GOP (B_{GOP}). The denominator is not the claimed remaining bit amount for each picture.

Thus, claim 3 should be patentable without regard to its dependency.

[Claim 5]

This claim should be patentable at least due to its dependency.

[Claim 6]

The Examiner alleges that the claimed apparatus for encoding a video signal is disclosed by Lin.

Applicant respectfully submits, however, that the claimed apparatus is not taught by the reference at least because the reference fails to teach the bit rate controller and quantization unit as recited in the claim.

The reference is directed to load balancing between two processors used for video encoding. One processor P1 does interpolation, motion estimation (ME) and all auxiliary processing before ME, while the other processor P2 does DCT, IDCT, quantization, dequantization source coding (SC) and all auxiliary processing after SC. That being said, the cited part (col. 4, lines 1-25) of the reference only discloses how to skip the P2 operation in case that sum of absolute differences (SAD) between macro blocks of a frame. This operation is not related to the operation of the bit rate controller to produce a QP used in the quantization unit. The reference simply teaches how to skip P2 operation which includes a quantization operation. In this respect, the reference does not teach about bit rate control.

While the reference does not teach the bit rate controller, the reference is also silent about the bit amount for each picture and a complexity for each picture generated per frame. The reference is directed to only the SAD between macro blocks, which constitute only one frame of a GOP, to determine whether to skip the P2 operation.

Therefore, Lin would not have anticipated the claimed apparatus at least due to its failure to teach the claimed bit rate controller and quantization unit.

[Claim 7]

This claim should be patentable as the primary reference (Ribas-Corbera) fails to teach at least the claimed remaining bit amount calculator under the same analysis for claim 1.

III. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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